

WHAT IS CLAIMED IS:

1. A soft magnetism metal powder comprising a majority of particles each of which has no greater than ten crystal particles on average in its cross-section.

2. The soft magnetism metal powder of Claim 1, wherein each particle comprises a parent phase and a resistive material on an outer surface of the particle, and the resistive material has a higher resistivity than the parent phase.

3. The soft magnetism metal powder of Claim 2, wherein the soft magnetism metal particle is an alloy comprising iron as a main component and less than 3.5 weight% of an alloying element, wherein the alloying element is more easily oxidized than iron, the higher resistive material is in the form of an oxide, and the oxide is prepared by selectively oxidizing the alloying element by heating the particles.

4. The soft magnetism metal powder of Claim 2, wherein the resistive material is a phosphate acid family conversion treated coating.

5. The soft magnetism metal powder of Claim 2, wherein the resistive material is coated on the outer surface of each of the soft magnetism particles.

6. The soft magnetism metal powder of Claim 5, wherein the coating of the resistive material on the soft magnetism metal particle is prepared by mechano-fusion.

7. The soft magnetism metal powder of Claim 4, wherein the phosphate acid family conversion treated coating is prepared by applying a treating liquid comprising a phosphoric acid on the outer surface of the soft magnetism metal particle and drying the treating liquid.

8. The soft magnetism metal powder as set forth in Claim 1, wherein an outer surface of the soft magnetism metal particle is coated with a conversion treated coating.

9. The soft magnetism metal powder of Claim 1, prepared by heating the soft

magnetism metal particles to a high temperature in a high temperature atmosphere, thereby reducing the number of crystal particles in each of the soft magnetism metal particles.

5 10. The soft magnetism metal powder of Claim 4, wherein the soft magnetism metal particles are connected to each other by the phosphoric acid family conversion treated coating.

10 11. A method of treating a soft magnetism metal powder comprising the steps of:
preparing soft magnetism metal particles; and
heating the soft magnetism metal particles in a high temperature atmosphere, whereby the number of crystal particles in each of the soft magnetism metal particles is reduced when compared to the number of crystal particles in the soft magnetism metal particles before the heating.

15 12. The method of treating a soft magnetism metal powder of Claim 11, wherein the number of crystal particles in each of the soft magnetism metal powder particles after heating is reduced by at least half when compared to the number of crystal particles before heating.

20 13. The method of treating a soft magnetism metal powder of Claim 11, wherein the number of crystal particles in each of the soft magnetism metal particles is no greater than ten on average after heating.

25 14. The method of treating a soft magnetism metal powder of Claim 11, wherein the high temperature atmosphere is a nonoxidative atmosphere, and the heating temperature ranges from 750 to 1350°C.

30 15. A method of preparing a soft magnetism metal powder having a majority of soft magnetism metal particles coated with a higher resistive material and coated a phosphoric acid family conversion treated film, comprising the steps of:

preparing a mixture of soft magnetism metal particles comprising an alloy of iron, as a main component, and less than 3.5 weight% of an alloying element, wherein the alloying element is more easily oxidized than iron;

generating a higher resistivity material, in the form of an oxide, wherein the oxide is generated on the outer surface of the soft magnetism metal particle by selectively oxidizing the alloying element in an atmosphere which is reducing to iron and oxidizing to the alloying element;

5 applying a treating liquid comprising a phosphoric acid on the outer surface of the soft magnetism metal particle; and
 drying the treating liquid.

10 16. A method of preparing a soft magnetism metal powder having a majority of soft magnetism metal particles coated with a higher resistive material coated with a phosphoric acid family conversion treated film, comprising the steps of:

 preparing a mixture of the soft magnetism metal particles each of which has no greater than ten crystal particles on average in its cross-section;

15 coating the higher resistive material on an outer surface of each of the soft magnetism metal particles by mechano-fusion of the higher resistive material and the soft magnetism metal particles;

 applying a treating liquid comprising phosphoric acid on the outer surface of the soft magnetism metal particle; and
 drying the treating liquid.

20 17. A soft magnetism metal formed body comprising a majority of the soft magnetism metal particles of Claim 1, which are coupled together with each other, and each of which have a cross-section having no greater than ten crystal particles on average.

25 18. A method of producing a soft magnetism formed body comprising the steps of: preparing a mixture comprising the soft magnetism metal powder of Claim 1, and pressing the mixture of the soft magnetism metal powder.

30 19. The method of Claim 18, wherein the pressing is carried out at a temperature of 150 to 600°C.

 20. The method of Claim 18, wherein the pressing is carried out at a temperature of

450 to 600°C.

21. The method of Claim 18, wherein the pressing is carried out at a pressure of 4.5 to 7 tonf/cm².

22. The method of Claim 3, wherein the amount of alloying element is 0.3 to less than 3.5 weight %.

23. The method of Claim 11, wherein the heating temperature is 750 to 1320°C.

24. The method of Claim 11, wherein the heating is carried out for a time of 20 minutes to 2 hours.

25. The soft magnetism metal powder of Claim 1, wherein the metal comprises an alloy of iron, as a main component, no more than 3.5 wt% of at least one alloying element selected from the group consisting of Al, Mg, Si, and Ca, no more than 0.1 wt% C, and no more than 0.5 wt% O.

26. The soft magnetism metal powder of Claim 1, wherein the particle size of the powder is 10 to 300 μm .